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ABSTRACT

The United States Training and Employment Service General Aptitude Test Battery (GATB), first published in 1947, has been included in a continuing program of research to validate the tests against success in many different occupations. The GATB consists of 12 tests which measure nine aptitudes: General Learning Ability; Verbal Aptitude; Numerical Aptitude; Spatial Aptitude; Form Perception; Clerical Perception; Motor Coordination; Finger Dexterity; and Manual Dexterity. The aptitude scores are standard scores with 100 as the average for the general working population, and a standard deviation of 20. Occupational norms are established in terms of minimum qualifying scores for each of the significant aptitude measures which, when combined, predict job performance. Cutting scores are set only for those aptitudes which aid in predicting the performance of the job duties of the experimental sample. The GATB norms described are appropriate only for jobs with content similar to that shown in the job description presented in this report. A description of the validation sample is included. (AG)

ED 060103

FINAL REPORT

TECHNICAL REPORT

ON

STANDARDIZATION OF THE GENERAL APTITUDE TEST BATTERY

FOR

Material Coordinator 221.168

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B-307 S-64

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U. S. Employment Service in
Cooperation with
Texas State Employment Service

U. S. DEPARTMENT OF LABOR

Washington , D. C.
March 1955

GATB #021
Winter 1954

STANDARDIZATION OF THE GENERAL APTITUDE TEST BATTERY
FOR
Material Coordinator 221.168

S-64

Summary

The General Aptitude Test Battery, B-1001, was administered to 51 men employed as Material Coordinator at Consolidated Vultee Aircraft Corporation, Fort Worth, Texas. The criterion consisted of broad category supervisory ratings made by the Foreman. On the basis of mean scores, standard deviations, correlations with the criterion, job analysis data, and their combined predictive efficiency, Aptitudes G - Intelligence, N - Numerical Aptitude and Q - Clerical Perception were selected for inclusion in the test norms.

GATB Norms for Material Coordinator 221.168-S-64

Table I shows, for B-1001 and B-1002, the minimum acceptable score for each aptitude included in the test norms for Material Coordinator 221.168.

TABLE I

Minimum Acceptable Scores on B-1001 and B-1002 for S-64

B-1001			B-1002		
Aptitude	Tests	Minimum Acceptable Aptitude Score	Aptitude	Tests	Minimum Acceptable Aptitude Score
G	CB-1-H CB-1-I CB-1-J	80	G	Part 3 Part 4 Part 6	75
N	CB-1-D CB-1-I	75	N	Part 2 Part 6	70
Q	CB-1-B	75	Q	Part 1	80

Effectiveness of Norms

The data in Table IV indicate that 11 of the 17 poor workers, or 65 percent of them, did not achieve the minimum scores established as cutting scores on the recommended test norms. This shows that 65 percent of the poor workers would not have been hired if the recommended test norms had been used in the selection process. Moreover, 27 of the 33 workers who made qualifying test scores, or 82 percent, were good workers.

TECHNICAL REPORT

I. Problem

This study was conducted to determine the best combination of aptitudes and minimum scores to be used as norms on the General Aptitude Test Battery for the occupation of Material Coordinator 221.168.

II. Sample

The General Aptitude Test Battery, B-1001, was administered during February 1954 to 51 men employed as Material Coordinators at the Consolidated Vultee Aircraft Corporation, Fort Worth, Texas. All of the workers in this sample were experienced Stock Chasers.

Table II shows the means, standard deviations, ranges, Pearson product-moment correlations (corrected for broad categories) with the criterion, and the standard errors of correlation for age, education and experience.

TABLE II

Means (M), Standard Deviations (σ), Ranges, Pearson Product-Moment Correlations (Corrected for Broad Categories) with the Criterion ($_{c}r$), and the Standard Errors of Correlation ($\sigma_{c}r$) for Age, Education, and Experience

Material Coordinator 221:168
N = 51

	M	σ	Range	$_{c}r$	$\sigma_{c}r$
Age (years)	31.4	8.1	21 - 48	-.189	.135
Education (years)	10.9	2.7	3 - 16	.272	.130
Experience (months)	50.4	32.4	12 - 132	.248	.131

There are no significant correlations with the criterion for age, education or experience. Two men had less than a sixth grade education. However, their test scores did not appear to vary from those of the other workers so they were retained in the sample.

III. Job Description

Job Title: Material Coordinator 221.168

Job Summary: Arranges and distributes shop orders according to an established production schedule. Dispatches materials, parts, tools and/or equipment of high priority or short supply for an assigned work station in any one of the following phases of aircraft manufacturing: fabrication, major and sub-assembly, field operations or development.

Work Performed:

Determines from shop orders those materials, parts, tools and/or equipment, not readily available, but required for job operations. Searches out and obtains

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required materials, parts, tools and equipment, usually from stock or "sequence jobs," and moves them personally, carrying them on foot or on a bicycle or motor scooter to the job site or providing for their delivery in accordance with established schedules and/or priorities. Reports items unavailable, or preceding work sequences not ready, to Production Control Department and makes periodic status checks of jobs in assigned or sequence work stations to report behind schedule conditions delaying production progress. May expedite delivery of completed orders to other work stations in accordance with furnished information. May take physical inventories of stock, tool or equipment storage rooms in area to locate shortage items. May assist Manufacturing Control Dispatcher and/or Shortage Follow-Up Men in expediting high priority orders.

IV. Experimental Battery

All of the tests of the GATB, B-1001, were administered to the sample group.

V. Criterion

The criterion used consisted of broad category ratings made by the foreman of the 51 workers in the sample. The workers were rated as good, average, and poor and 17 workers were placed in each of these three groups. The criterion ratings were converted to quantitative values which resulted in criterion scores of 61 for the group of good workers, 50 for the group of average workers, and 39 for the group of poor workers.

VI. Statistical and Qualitative Analysis

Table III shows means, standard deviations, Pearson product-moment correlations (corrected for broad categories) with the criterion, and standard errors of correlation for the aptitudes of the GATB. The means and standard deviations of the aptitudes are comparable to general population norms with a mean of 100 and a standard deviation of 20.

TABLE III

Means (M), Standard Deviations (σ), Pearson Product-Moment Correlations (Corrected for Broad Categories) with the Criterion ($_cr$) and Standard Errors of Correlation ($\sigma_c r$) for the Aptitudes of the GATB

Material Coordinator 221.168

N = 51

Aptitudes	M	σ	$_cr$	$\sigma_c r$
G-Intelligence	96.7	15.5	.352*	.123
V-Verbal Aptitude	90.9	14.0	.185	.135
N-Numerical Aptitude	94.8	19.0	.389**	.119
S-Spatial Aptitude	100.2	19.6	.277*	.129
P-Form Perception	94.8	19.2	.345*	.123
Q-Clerical Perception	85.6	15.3	.466**	.110
A-Aiming	85.9	22.4	.355*	.122
T-Motor Speed	84.5	22.5	.293*	.128
F-Finger Dexterity	89.0	21.6	.211	.134
M-Manual Dexterity	102.0	23.5	.162	.136

** Significant at the .01 level
* Significant at the .05 level

The statistical results were interpreted in the light of the job analysis data. The job analysis indicated that the following aptitudes measured by the GATB appeared to be important for this occupation.

> Intelligence (G) - required to identify and comprehend the meaning of data contained in reports and also to be able to reason and make judgments.
>
> Clerical Perception (Q) - required in the comparison of parts numbers to identical numbers on shop orders, and also to take physical inventories of stock, tool or equipment storage rooms.
>
> Numerical Aptitude (N) - required to a lesser degree in the counting of parts to complete work orders and in computing the time required to complete the processes from one stage of sequence to another, taking into account the time available within the schedule and the time that is allocated to other work.

The highest mean scores in decreasing order of magnitude were obtained for Aptitudes M, S, G, N and P, respectively. All of the aptitudes, except Aptitudes A, T, F, and M have standard deviations of less than 20. The smallest standard deviations were obtained for Aptitudes G, V and Q.

When N = 51, correlations of .358 and .276 are significant at the .01 level and the .05 level, respectively. Aptitudes N and Q correlate significantly with the criterion at the .01 level of confidence. Aptitudes G, S, P, A and T correlate significantly with the criterion at the .05 level of confidence.

Aptitudes G, N and Q were selected for inclusion in the test norms on the basis of the qualitative and quantitative factors cited above. All three of these aptitudes appear to have some importance in terms of job analysis data. In addition, Aptitudes G, N and Q show significant correlations with the criterion, relatively high mean scores were obtained for Aptitudes G and N, and the sample tends to be relatively homogeneous with respect to Aptitudes G and Q.

Although there is some statistical evidence to warrant consideration of Aptitudes S, P, A, T and M for inclusion in the test norms, none of these aptitudes appeared to be sufficiently important on the basis of job analysis data to warrant further consideration. Therefore, none of these aptitudes was included in the final test norms.

The cutting scores for Aptitudes G and N were set at one standard deviation unit below the sample means and rounded to the nearest five point score levels. For Aptitude Q, the cutting score was set at one standard deviation below the mean and rounded to the higher adjacent five point score level. Setting cutting scores at these levels yielded the best selective efficiency for the norms and resulted in critical scores of 80, 75 and 75 for Aptitudes G, N, and Q, respectively.

VII. Concurrent Validity of Norms

For the purpose of computing the tetrachoric correlation coefficient between the test norms and the criterion and applying the Chi Square test, the criterion was dichotomized by placing those workers who were rated Good and Average into the high criterion group and those workers who were rated Poor into the low criterion group.

Table IV shows the relationship between test norms consisting of Aptitudes G, N and Q with critical scores of 80, 75 and 75, respectively and the dichotomized criterion for Material Coordinators . Workers in the high criterion group have been designated as "good workers" and those in the low criterion group as "poor workers."

TABLE IV

Relationship Between Test Norms Consisting of Aptitudes G, N, and Q with Critical Scores of 80, 75, and 75, Respectively and the Criterion for Material Coordinator 221.168

N = 51

	Non-Qualifying Test Scores	Qualifying Test Scores	Total
Good Workers	7	27	34
Poor Workers	11	6	17
Total	18	33	51

$r_{tet} = .65$ $\quad X^2 = 7.824$

$\sigma_{r_{tet}} = .23$ $\quad P/2 < .005$

The data in the above table indicate a significant relationship between the test norms and the criterion for this sample.

VIII. Conclusions

On the basis of mean scores, correlations with the criterion, job analysis data and their combined predictive efficiency, Aptitudes G, N, and Q with minimum scores of 80, 75 and 75, respectively, are recommended as B-1001 norms for the occupation of Material Coordinator . The equivalent B-1002 norms consist of G-75, N-70 and Q-80.